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ABSTRACT

The purpose of this paper is to advance the argument that universities should move toward using distance education as rapidly and as fully as possible. The paper discusses three reasons to support the proposition: (1) Technological advances have brought us to a point that most of the university curriculum can be individualized and delivered via the Internet both easily and effectively. Bandwidth problems have been largely eliminated. Within the next two or three years the available bandwidth will be sufficient for full motion video at 30 frames per second, coupled with streaming sound. This will provide full multimedia potential; (2) Distance education is, in the long term, a more effective and efficient delivery system for colleges and universities than the traditional face-to-face models that are most commonly used. Development can be costly, but once the preparations are made, the same unit of instruction can be delivered multiple times with uniform quality. In addition, the Internet and related software can facilitate record keeping, including registration, grades, attendance, and billing; and (3) Distance education is far better for the learner than is the traditional model because it can provide truly individualized instruction, and 'just-in-time' delivery to a learner at any location. (Author/AEF)

This paper is seven (7) typewritten pages long, including endnotes.

[Abstract] [Introduction] [Purpose of the paper] [Definitions of terms] [The argument] [Conclusion] [End notes]

At Last! Individualized Instruction is Finally Possible through Online Interactive Multimedia

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Abstract

Universities should move into distance education as rapidly and fully as possible for three compelling reasons.

(1) Technological advances have brought us to a point that most of the university curriculum can be individualized and delivered via the Internet both easily and effectively. Bandwidth problems have been largely eliminated. Within the next two or three years the available bandwidth will be sufficient for full motion video at 30 frames per second, coupled with streaming sound. Thus we will have full multimedia potential—and we already have full interactivity.

(2) Distance education is, long term, a more efficient and effective delivery system for the institution than traditional face-and-say delivery systems used in most colleges and universities. Development can be costly, but once prepared, the same unit of instruction can be delivered with uniform quality many times.

In addition, the Internet and related software facilitate record keeping of all kinds, from registration and grades through attendance patterns and even billing. With the right software, the students can be made responsible for their own record keeping!

(3) Distance education is more efficient and effective for the learner than is the traditional model of higher education.

Introduction

As institutions of higher education enter the 21st century, they also enter an era of digital

competition. There exists a growing demand among learners for improved accessibility and convenience, for lower costs, and for direct application of content to their work settings. This growing demand is rapidly changing the way higher educational institutions are delivering courses. The changes, in turn, are the inevitable result of increasing advances in digital communications and learning technologies.

Purpose of the paper

The purpose of this paper is to advance the argument that Universities should move into distance education as rapidly and fully as possible. Three compelling reasons underlie this proposition, and they are the lines of analysis this paper will pursue. First, we have finally achieved a level of technological sophistication that we could, if we chose, offer the entire university curriculum to individual learners via the Internet, and we can do so both easily and effectively. Second, distance education is, long term, a more efficacious delivery system for the institution than traditional face-and-say delivery systems used in most colleges and universities. Third, distance education is more efficacious for the learner than any other delivery system currently available or likely to arise in the future. At last! Individualized instruction is finally possible through online interactive multimedia.

Definitions of Terms

Five terms are critical to this argument, and therefore bear definition.

1. ***Distance education*** refers to any instructional delivery system in which a learner can access instructional materials in a place removed from the source of the instruction. If the instructional material is accessed at the same time it is produced—such as, for example, during a teleconference—the delivery system is said to be "synchronous." If the instructional material is accessed at a different time from when it was produced—such as, for example, a programmed unit of instruction housed on a CD-ROM or as an html file on a university server—the delivery system is said to be "asynchronous."

   Distance education offered online—through the Internet or via a CD-ROM—is, by its nature, offered to a single, individual learner working at his or her computer. In some cases the individual may be connected to other individuals working at their computers at the same time. However, that does not change the essential feature of online instruction—that it is individualized.

2. ***Individualized instruction*** refers to instruction aimed at a single learner and designed to accommodate that individual learner's learning needs. Individualized instructional materials allow the learner to create and follow a unique path through the materials. Learners respond to materials individually, and have the materials respond to the learner's choices and actions individually. Branching programmed textbooks from the 1960s illustrate early attempts to develop such instructional materials.
3. ***Traditional model*** refers to the commonly used model of higher educational in which resident students from a recognized "service area" meet with full-time faculty members during regularly scheduled class periods in a particular classroom or laboratory. In the traditional model, the institution has a central library on a permanent campus designed to serve as the locus for delivery of instruction.
4. ***Effective*** means producing a specific, definite, desired effect or result. For example, if the desired effect of a unit of instruction is for the learner to be able to write a planning outline for

an argumentative speech to certain specifications, the instruction is effective to the extent the learner can write that planning outline to those specifications as a result of the instruction.

5. ***Efficient*** means producing a desired effect or result with a minimum of effort, expense, or waste. To the extent that a unit of instruction is effective with a minimum of effort, expense, or waste, that unit of instruction is efficient. If a learner can achieve instructional goals in less time, with less effort using online instruction than when working in the traditional model, then online instruction is more efficient for the learner. If online instruction can be shown to minimize instructor effort, cost less, and reduce or eliminate wasteful redundancy when compared to the traditional model, then the instructional unit is more efficient for the institution.

The Argument

Three lines of analysis support the argument that colleges and universities should embrace distance education as rapidly as possible. Let's take these lines of analysis up one at a time.

First, technological advances have brought us to a point that most of the university curriculum can be individualized and delivered via the Internet both easily and effectively. Bandwidth problems have been largely eliminated. Indeed, within the next two or three years the available bandwidth will be sufficient for full motion video at 30 frames per second, coupled with streaming sound. Thus we will have full multimedia potential—and we already have full interactivity. And so, our technology allows us every kind of contact with our students at a distance that we can use in a face-to-face context. We can offer text, graphics, color, full motion video, sound, and true interactivity. We can offer synchronous and asynchronous educational experiences via the Internet. We can offer just-in-time instruction that follows the learner's demands, and learns from the learner's mouse and keyboard behavior. Indeed, with the exception of certain laboratory courses that require the students to use very expensive equipment they could not be expected to purchase—such as, for example, television production equipment—most of the university curriculum could be offered at any time to anyone who owns a computer with a modem and has access to a telephone line.

What we do not have is the programming. That is, we need only to employ designers and programmers to develop the materials to be presented on line. This, of course, may be the biggest stumbling block to full acceptance of distance education, but it is not an insurmountable one. Colleges and universities could determine to pursue this path—to spend the money and to develop the software and the relational database applications that will render this distance education model viable. They could, and my first argument is that they should.

My second argument is that **distance education is, in the long term, a more effective and efficient delivery system for colleges and universities than the traditional model most commonly in use.**

Right now, the most common model of instruction is for a faculty member to prepare to deliver his or her courses to rooms full of students. The courses are designed to be presented within a semester or quarter system. The professor may teach three separate courses in a semester, and may have as few as five or ten students, or as many as a lecture hall full.

The course is designed, a syllabus is constructed, including a calendar of events for that term, instructional materials are developed (most commonly, lecture notes supported (sometimes) by transparencies developed for an overhead projector. It may be the professor uses cases in the course, shows videotapes, invites outside speakers, and so on.

If the professor is a good teacher she or he may incorporate a variety of instructional and measurement techniques during the term. When the professor is having a good day, the classroom instruction may be brilliant. When the professor is down, instructional quality is likely to be down as well. When more than one instructor presents the same course in more than one section—as commonly happens in multi-section courses such as public speaking, or English composition, great variation in instructional quality seems inevitable. No two teachers have the same gifts, the same talent, the same stamina, and the same communication skill. In the end, the students pass or fail the course, and the professor closes the file until the next time she or he is assigned to teach that course. At that point, the professor reopens the file, perhaps updates it, develops a new calendar for the new term, and begins the delivery cycle again.

This is an enormously costly and redundant use of professorial time and expertise. How often should the same classroom teacher have to explain to a public speaking class how to develop a planning outline, or how to analyze a classroom audience? How often can that classroom teacher do so before losing interest?

And what about the multitude of other cyclical events that must occur in the traditional model of university instruction? For a single example, the registration and records office goes through the cycle of matriculating students, scheduling them for particular courses, keeping track of their course marks, and ultimately, their progress through the institution's curriculum to assure the students have met all the requirements for graduation.

The traditional model of college education involves at least six expensive characteristic features that do not have to obtain in distance education.*[1]*

1. Resident students
2. A recognized geographic service area
3. Full-time faculty who organize curricula and degrees, teach in face to face settings, engage in scholarship, conduct public service and share in institutional governance
4. A central library and physical plant
5. Non-profit financial status
6. Evaluation strategies for organizational effectiveness based on such features as cost of instruction, funding, library holdings, facilities, faculty/student ratios, faculty qualifications, and student qualifications

The heart of my second argument is that distance education technology can, to a large extent, eliminate these costly features of the traditional model and at the same time ensure consistently high quality of instruction—instruction that can be individualized and delivered at the learner's own best speed, when the learner wants it.*[2]* I would add that any savings in any of the six expensive features of the traditional model generates efficiency for the institution.

You might argue it would be costly to develop a full curriculum of interactive multimedia units for online delivery. I would agree. then I would respond that the distance education model I propose will increase the quality of instruction and eliminate demoralizing redundancy. Once prepared, the same units of instruction can be delivered with uniform quality many times via interactive multimedia presented on the Internet. In addition, the Internet and related software can be made to facilitate record keeping of all kinds, from registration and grades through attendance patterns and even billing. Indeed, with the right software, the students can become responsible for their own record keeping—never knowing they are doing so! This benefit already accrues to such organizations as

Olin Corporation, where employees are responsible for their own training. They log on from home to the corporate intranet and the central computer takes over. It knows the employee, knows what the employee has learned and what she or he still needs to learn, offers interactive online instruction and testing, and keeps the records required by five governmental regulatory agents. In the end, and online delivery system can save colleges and universities millions of dollars in the same way it currently saves millions of dollars in corporate training efforts.

In summary, my second line of analysis is that distance education is a more efficient and effective delivery system for colleges and universities than traditional face-and-say delivery system most commonly in use.

My third reason for believing universities and colleges should embrace the distance education model as rapidly as possible is, in my mind, by far the most important one. **Distance education is far better for the learner than is the traditional model** because it can provide truly individualized instruction, and "just in time" delivery to a learner at any place in the world where the learner can plug his computer into a modem. Distance education is better for the learner for three main reasons.

First, students learn as much or more and they learn it more rapidly through individualized instruction than they do through the traditional model. This conclusion was true when programmed instruction was the rage in the late 1960s and early 1970s.*[3]* We were limited to paper-based materials, but even so we could facilitate Gagne's eight instructional events.*[4]* What we could not do with paper-based materials was present full-motion video and sound. We could not link a learner to related materials nor provide instant and synchronous access to expert opinion. We could link learners to a group of other learners in order that they could talk things over when they needed or wanted to do so. And we could not turn very much control of the material over to the learners.

Now it is possible to present full-motion video and sound, so it is possible to provide very clear examples and to model behaviors we wish students to learn via distance education. A simple example comes to mind. Suppose an employee who must learn how to locate, read and interpret a gauge, then make an appropriate adjustment to a valve in order to assure some vital process continues to function smoothly. Now it is possible to provide links to groups, to distant expert opinion, to library and other related materials, etc. It seems reasonable to suppose that this potential to enrich what we did in the 1960s and 1970s increases our confidence in our research findings about the efficacy of individualized instruction.

Certainly, private corporations have been using interactive multimedia to enhance their training and to produce dramatic savings. They report very satisfactory results. Moreover, the growth in acceptance and use of online instruction have been mercurial. Consider the growth of CD-ROM Technology.

When the first truly interactive CD-ROMs appeared in 1989 they offered an incredible potential. Within four years some 900 titles were produced. However, one year later this number had grown to over 3,000. And by 1995 the total was over 12,000. In 1995 Alfred Vollmer estimated that the number of commercial CD-ROM titles would reach beyond 70,000 by 1997, and to grow annually by about 21%.*[5]* By 1999 the number of CD-ROMs shipped was expected to be almost 54-million units.*[6]*

Internet usage has grown similarly, and it is cheaper that CD-ROM technology to develop. In June 1999, CommerceNet reported that there are 92 million users 16 years old and older accessing the Internet in the US. The number of Internet users age 16 and older in the U.S. and Canada increased

16% in just nine months, and the number of on-line consumers jumped 40% to 28 million during the same period.*[7]* To illustrate, a key-word search of the AltaVista search engine, using the string *"internet use" AND training produced 13-million hits.*

Using programmed text materials, readers could create their own paths through the material, but they could not create new paths into new and related, but as yet unprogrammed material. Now it is possible to develop intelligent learning systems that adapt to individual learners based upon input data from the learners themselves, then to present online web pages that were never there before—pages custom tailored to individual learner's needs.

Because this rich multimedia environment is available, colleges and universities could offer very abstract materials via distance education—courses such as music appreciation, public speaking, and the like. Learners could pause, replay, pause again, and jump to additional examples and illustrative material, in the pursuit of mastery of very high-order cognitive behaviors.

This level of individualized is possible if colleges and universities would make it available. My major argument is that the colleges and universities could, and they should.

Second, online delivery means just in time delivery, and that's much better for the students. My daughter, Laura, provides a typical example of the adult learner who must incorporate her educational pursuits into a full life style of work and homemaking. She may be unable to drop her duties to attend a course in a traditional college classroom—say, one that meets regularly at 2:00 on Monday, Wednesday, and Friday afternoons. That's about the time her two children are going down for their naps. The naptime quiet, however, gives her an opportunity to log onto her computer and to pursue her lesson for an hour or so. Later, when her husband can take a share of the child-care responsibilities, Laura could log on again. This might be at 7:23 p.m. or at 11:05 p.m. Laura's situation is not uncommon. Early risers may wish to log on to their computer classwork early in the morning. Some learners prefer the late evening hours over daylight hours for study and practice. Still others prefer to take their study opportunities in small time units distributed throughout their days.

Third, online delivery means anywhere needed delivery. That, too, is better for the student than the traditional model. My daughter-in-law, Cathron, provides an excellent illustration. She is a very successful, and very busy executive who works, mainly, as a computer commuter out of her home office, but who must travel from her home in Denver to major cities around the globe once or twice each month. Thus she has a good deal of usable time to pursue additional education. She can "download" asynchronous instructional materials from the Internet, use them during long flights, plug her computer into the telephone jack after she registers in her hotel, and interact with her instructor or with her classmates. She can check out directions newly posted by her instructor. Using the same hook-up she can access library materials, incorporate those materials into her studies, and send completed work to her professor. She can do this from Paris, New York, San Francisco, or Tokyo. Indeed, she completed most of her MBA program in precisely this way.

Conclusion

In conclusion, three lines of analysis have led me to propose that universities should embrace a model of distance education that uses interactive multimedia and the Internet as rapidly and fully as possible. First, our current state of technological sophistication makes it possible to do. Second, distance education is, long term, a far more effective and efficient delivery system for the institution than the traditional model most of them use. Third, distance education is much better for the learner

than any other delivery system currently available or likely to arise in the future.

Notes

1. Donald E. Hanna, "Higher Education in an Era of Digital Competition: Emerging Organizational Models" *JALN* 2:1 (March, 1998). http://www.aln.org/alnweb/journal/vol2_issue1/hanna.htm

2. Obviously, other models of higher education are emerging that incorporate some features of distance education in an effort to increase effectiveness and efficiency for higher education centers. For example, corporations have begun to fund their own universities, or to enter into alliances with universities for on site delivery of specialized and general course work. In addition, some institutions have developed extension divisions that offer classroom and laboratory instruction in such places as shopping centers. Such alternative models exist, but they are not the focus of this paper.

3. Michael S. Hanna, "Chapter II, Review of the Literature," *A Comparison of Three Modes of Instruction of Organization of Ideas* (Doctoral dissertation, University of Missouri, 1971). See, also, James R. Rawls, Oliver Perry, and E. O. Timmons, "A Comparative Study of Conventional Methods and Individual Programmed Instruction in the College Classroom," Journal of Applied Psychology, (L: 5, October, 1966), pp. 388-389. See, also, Kenneth A. Johnston, "Programmed Instruction vs. Conventional Teaching: A Study of Learning and Retention in Language Arts" (Doctoral dissertation, Washington State University, 1964).

4. Robert M. Gagne, *The Conditions of Learning* (New York: Holt, Rinehart and Winston, Inc., 1965). See, also, Robert M. Gagne, *Principles of Instructional Design* (New York: Holt, Rinehart and Winston, Inc., 1992. The eight events are: (1) Gaining attention, (2) Informing learners of objectives, (3) Stimulating recall of prior learning, (4) Presenting the new learning material, (5) guiding the individual through the learning experience, (6) Eliciting performance to see if learning has occurred, (7) giving appropriate and timely feedback, and (8) Ensuring and enhancing retention and transfer of what is learned.

5. Alfred Vollmer, "Worldwide CD-ROM Drive Sales Exhibit Stellar Growth," *Electronics* (February 27, 1995) p. 11. See, also, Patrick M. Reilly, "Of a Mouse and Men," *Wall Street Journal* (September 15, 1995), R14.

6. Marilyn A. Gillen, "Huge Growth Predicted for Multimedia, and Music," *Billboard* (August 12, 1995), p. 66.

7. www.computereconomics.com/new4/pr/pr990610.html

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